San Francisco as a Distributed Energy Resource 'Test-Bed' Site

Sponsored by the

California Energy Commission

Public Interest Energy Research (PIER) Program

Research Hypothesis

- List role of SF Coop

San Francisco Study Area

Map of the south-east SF with study area highlighted

Study Area Statistics

Summer & Winter Peaks

5.35 Square Miles

18,369 Households

8,019 Businesses

Research Goals

Characterize the impact of DER on the distribution system in a real-world setting by addressing:

- *DER market questions*
- *Engineering questions*
- *Load research analysis questions*

Provide information geared to utility engineers and planners on the real-world economic and engineering performance of DER.

Project Objectives

- Identify and verify the economic and engineering impact of DER on the SF distribution system
- Take advantage of both planned and existing DER installations in the test-bed area
- Pursue a fair assessment of DER / grid interactions
- Provide documented results for this real-world study of DER

About the Researchers

- M-Cubed
  - DER customer interface, project coordination
- Energy & Environmental Economics, Inc.
  - Economics of DG, Load research analysis
- Electrotek Concepts
  - Metering and engineering analysis

Researcher's Roles

Evaluate the following:

- ***Appeal of DER alternatives to customers***
  - M-Cubed (customer interaction, value proposition)
- ***Economics of the area DER projects***
  - Energy and Environmental Economics (cost and benefits from different perspectives)
  - M-Cubed (customer value proposition)
- ***Load impacts and other engineering aspects of the projects***
  - Electrotek Concepts (metering / modeling the distribution system)
  - Energy and Environmental Economics (impact estimation)
  - M-Cubed (customer response and DER characterization)

Research Partners

- Pacific Gas & Electric Company
- California Energy Commission
- San Francisco Public Utilities Commission / Hetch Hetchy
- Private DER Owners
- Technology Vendors

Project Plan

Planned Project Phases	Anticipated Results	Duration
Phase 1: Economic Analysis & Marketing Plan Development	1. Appropriate Technologies 2. Project Approach	Dec 2003 - Mar 2004
Phase 2: DER Implementation & Load and System Results Monitoring	1. Load Profile Impact 2. Cost Impact 3. Participant Feedback	Mar 2004 - Mar 2005
Phase 3: Evaluation and Reporting	1. Cost/Benefit Analysis 2. Case Study 3. DR Primer	Mar 2005 - Jul 2005

Phase 1 Approach

- More detail on approach
- Challenges

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DER Resource Potential

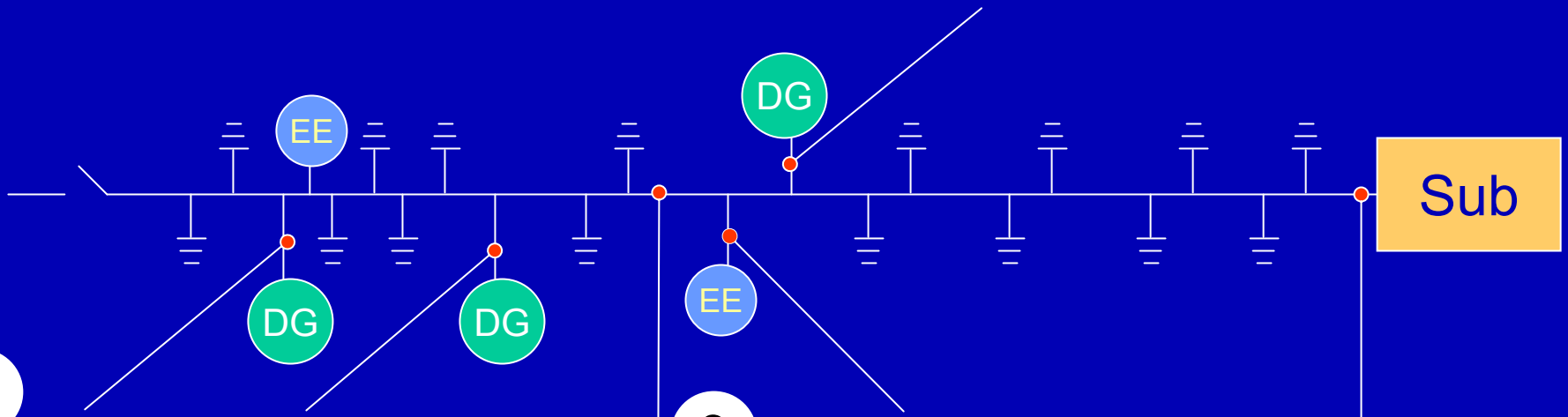
- Existing Distributed Generation
  - Air Resources Board List
  - SF PUC List / PG&E List
- Planned DER Efforts
  - CPUC Dynamic Pricing
  - CPUC DSM Program
- Interested DER Vendors

Phase 2 Approach

- More detail on approach
- Challenges

Stylized Feeder Load Research Plan

Four Types of Metering Points



1
DG Interval Data
Whole Facility Interval Data
Description of DG Installations

3
Whole Customer Interval Data
Historic and Current
Description of EE Measures

2
Power Quality Meter
We Have Budget for 2 Meters

4
Substation Interval Data

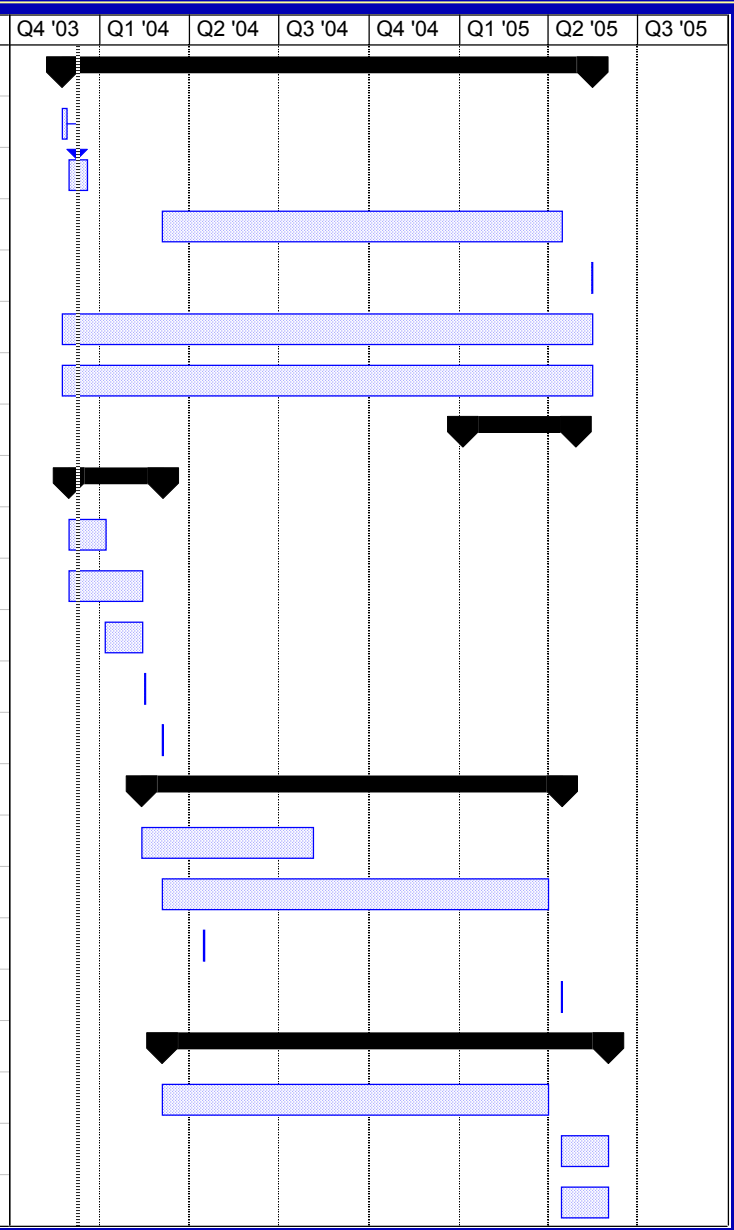
M-Cubed
Energy & Environmental Economics, Inc.
Electrotek Concepts, Inc.

Phase 3 Approach

- More detail on approach
- Challenges

Project Timeline

ID	Task Name
1	**Administrative Tasks**
2	Attend Kick-off Meeting
3	Conduct Technical Advisory Committee (TAC) Meetings
4	CPR Meetings
5	Final Meeting
6	Monthly Progress Reports
7	Test Plans, Technical Reports & Interim Deliverables
8	Final Report
12	**Program Design & Analysis (Phase I)**
13	Review of Area Characteristics & Needs
14	Review of Technologies, Approaches, & Subsidies
15	Cost/Benefit Analysis, Monitoring, & Research Plan
16	TAC Meeting
17	1st Critical Project Review
18	**DER Implementation (Phase II)**
19	Participant Recruitment & Technology Implementation
20	Data Collection
21	TAC Meeting
22	2nd Critical Project Review
23	**Performance Tracking and Reporting (Phase III)**
24	Performance Tracking Review
25	Case Study Evaluation & Lessons Learned
26	Public Workshop



Research Support Requested

What?	Who?	How?
Identify existing and planned DER in study area	E3 SF PUC PG&E Vendors	Provide available contacts and/or documentation contacts
Assist in metering/ data collection efforts	PG&E DER Customers	- Identify DER on specific feeders - Identify specific feeders to focus on during study - Provide loading data at whole feeder level